# CLAIMS

What is claimed is:

1. A high performance HIP generation system comprising:

at least one of a character cache component that stores a plurality of characters and an arc cache component that stores a plurality of arcs;

a warp field cache component that stores a pre-computed warp field, wherein the pre-computed warp field comprises a plurality of sub-regions;

a component that selects any number of at least one of characters or arcs to form a binary HIP sequence; and

a warping component that maps the HIP sequence to any one of the plurality of sub-regions selected from the warp field cache to facilitate warping the HIP sequence.

2. The system of claim 1, wherein the characters are stored as bitmaps in binary form in the character cache component.

3. The system of claim 1, wherein the arcs are stored as bitmaps in binary form in the arc cache component.

4. The system of claim 1, wherein the character cache component is built up over time as HIPs are generated.

5. The system of claim 1, wherein the arc cache component comprises background arcs.

6. The system of claim 1, wherein the arc cache component comprises foreground arcs.

7. The system of claim 1, wherein the arcs are randomly combined with the characters based in part upon using low discrepancy quasi random numbers.

8. The system of claim 1, wherein the warp field cache component comprises a relatively large two-dimensional image stored as a matrix of integers whose dimensions are several times larger than that of a single HIP sequence.

9. The system of claim 8, wherein the sub-region of the warp field comprises a random contiguous sub-matrix of the size of the HIP is extracted from the warp field cache component and used to warp the HIP sequence such that a mapping of the warp field to the HIP moves pixels of the HIP by amounts specified by the integers in a selected warp field sub-matrix.

10. The system of claim 1, the warp field cache component is the sum of two warp fields.

11. The system of claim 10, wherein the two warp fields comprise a global warp field and a local warp field.

12. The system of claim 11, wherein the global warp field has a large magnitude and a high decay factor and the local warp field has a small magnitude and a small decay factor such that the global warp field generates large smooth distortions and the local warp field generates small rough distortions.

13. The system of claim 1, wherein the warp field cache component is refreshed or updated at a frequency that facilitates maintaining an addition of entropy to the HIP generation system.

14. The system of claim 1, wherein the character cache component is updated when a font of the character changes.

15. The system of claim 1, wherein the arc cache component is updated at a frequency to facilitate maintaining an addition of entropy to the HIP generation system.

16. An advanced HIP generation system comprising a character sequence generation component that generates a HIP sequence, the HIP sequence comprising some number of characters and some amount of clutter combined with the characters; and a warping component that warps the HIP sequence at a high resolution in binary form such that a warped HIP sequence appears in black and white.

17. The system of claim 16, further comprising a customization component that adds at least one of texture, blending between a foreground and background of the HIP, and color to the HIP.

18. The system of claim 17, wherein the customization component resides on a client-side of the HIP generation system.

19. The system of claim 1, further comprising a down-sampling component that down-samples the HIP sequence after it has been warped by any factor greater than one.

20. The system of claim 19, wherein a down-sampled HIP sequence is in grayscale and smaller in size than the HIP after it has been warped.

21. The system of claim 20, wherein the down-sampled HIP sequence is anti-aliased.

22. The system of claim 19, wherein the down-sampling is bicubic.

23. The system of claim 1, wherein the arc cache component comprises a plurality of cubic splines of varying arc widths.

24. The system of claim 16, wherein the warping component comprises at least one of a graphics processing unit (GPU) and at least one of a 64-bit or a 128-bit single instruction multiple data (SIMD) operations on a 32-bit processor that are provided through at least one of multimedia extensions (MMX), streaming SIMD extensions (SSE), or streaming SIMD extensions 2 (SSE2) instruction sets.

25. The system of claim 1 resides on a server.

26. The system of claim 1, further comprising a HIP verification system that randomly or non-randomly collects live samples of HIPs being served to users to determine error or success rates of character placement or arc placement with respect to the characters to facilitate altering future HIP generation.

27. The system of claim 1, wherein the character cache component comprises a plurality of scaled and/or rotated characters.

28. The system of claim 1, wherein the pre-rendered characters are any one of non-anti-aliased or anti-aliased.

29. The system of claim 1, wherein the HIP sequence is non-anti-aliased.

30. The system of claim 1, wherein the pre-rendered arcs are one of non-anti-aliased or anti-aliased.

31. The system of claim 1, further comprising at least one random generator that randomly selects any number of pre-rendered characters, pre-rendered arcs, pre-rendered clutter, and pre-computed sub-regions of a warp field.

32. The system of claim 31, wherein the random numbers are generated in batches and buffered for improved performance.

33. The system of claim 1, wherein the character cache component is encoded in at least one run-length format, jpeg format, and gif format depending on a desired speed of HIP generation.

34. The system of claim 1, wherein the character cache comprises a plurality of pre-rendered characters and the arc cache comprises a plurality of pre-rendered arcs.

35. The system of claim 1, wherein at least some arcs are randomly combined with the characters in such a way that they do not overlap with the characters.

36. A method of generating a high performance HIP comprising:

caching at least one of a plurality of pre-rendered characters to a character cache and a plurality of pre-rendered arcs to an arc cache;

caching a pre-computed warp field to a warp field cache, wherein the pre-computed warp field comprises a plurality of sub-regions;

selecting any number of pre-rendered characters and any number of arcs to form a HIP sequence; and

warping the HIP sequence in part by mapping the HIP sequence to any one sub-region selected from the warp field cache.

37. The method of claim 36, wherein at least one of the characters and the arcs are pre-rendered and cached as bitmaps in binary form.

38. The method of claim 36, wherein the pre-rendered arcs comprise at least one of foreground arcs, background arcs, and arbitrary clutter, wherein the arbitrary comprises pieces of characters.

39. The method of claim 36, wherein selecting any number of pre-rendered characters and any number of pre-rendered arcs and any one sub-region is performed in a random manner.

40. The method of claim 36, further comprising randomly positioning the number of selected arcs with respect to the characters in the HIP sequence based at least in part on using low discrepancy quasi random numbers.

41. The method of claim 36, further comprising pre-computing the warp-field before it is cached to yield a matrix of integers having dimensions several times larger than the HIP sequence such that the warp-field is re-used multiple times to warp new HIP sequences.

42. The method of claim 41, wherein the plurality of sub-regions of the warp field each comprise a random contiguous sub-matrix of the size of the HIP to be employed to warp a plurality of HIP sequences.

43. The method of claim 36, wherein warping the HIP sequence comprises moving pixels of the HIP sequence by amounts specified by integers in a selected warp field sub-matrix.

44. An advance HIP generation method comprising generating a character sequence, the character sequence comprising any number of characters combined with any amount of clutter; and warping the HIP using at least one of the following:

a graphics processing unit (GPU); and

at least one of a 64-bit or a 128-bit single instruction multiple data (SIMD) operations on a 32-bit processor that are provided through at least one of multimedia extensions (MMX), streaming SIMD extensions (SSE), or streaming SIMD extensions 2 (SSE2) instruction sets.

45. The method of claim 36, further comprising:

updating at least one of the arc cache and the warp field cache at a frequency that facilitates maintaining an addition of entropy into the HIP generation method; and

updating the character cache when a font change occurs.

46. The method of claim 36, further comprising warping the HIP sequence in binary form at a high resolution.

47. The method of claim 36, further comprising down-sampling the HIP sequence by any integral or non-integral greater than one.

48. The method of claim 47, wherein the down-sampling takes place after the HIP sequence is warped.

49. The method of claim 47, wherein the down-sampling is bi-cubic.

50. The method of claim 47, wherein down-sampling decreases a size of the HIP sequence by about half to improve visual appeal of the HIP.

51. The method of claim 47, wherein down-sampling effectively anti-aliases the HIP sequence.

52. An advanced HIP generation method comprising:

selecting any number of characters and any number of arcs to form a HIP sequence;

warping the HIP sequence to yield a HIP image for widespread distribution and use; and

customizing the HIP image at least in part by adding at least one of texture and/or color to enhance an appearance of the HIP image.

53. The method of claim 52, further comprising randomly combining the arcs with the characters based in part upon using low discrepancy quasi random numbers.

54. The method of claim 52, wherein customizing the HIP image is performed by a client.

55. The method of claim 36 is performed by a server to maintain security and controlled access.

56. The method of claim 36, further comprising randomly generating numbers to determine random selections of pre-rendered characters and pre-rendered arcs to generate the HIP sequence and to determine random selection of the sub-region.

57. The method of claim 56, wherein the random numbers are generated in batches and buffered to improve performance.

58. The method of claim 36, wherein the character cache and the arc cache are encoded in at least one of run-length format, jpeg format, and gif format depending on a desired speed of HIP generation.

59. A data packet adapted to be transmitted between two or more computer processes facilitating improving performance and security of HIPs: information associated with caching pre-rendered characters, pre-rendered arcs, and a pre-computed warp field, generating a HIP sequence in part by randomly selecting any number of characters and arcs, and mapping the HIP sequence to a selected sub-region of the warp field to warp the HIP sequence.

60. A high performance HIP generation system comprising:

means for caching at least one of a plurality of pre-rendered characters to a character cache and a plurality of pre-rendered arcs to an arc cache;

means for caching a pre-computed warp field to a warp field cache, wherein the pre-computed warp field comprises a plurality of sub-regions;

means for selecting any number of pre-rendered characters and any number of arcs to form a HIP sequence; and

means for warping the HIP sequence at a high resolution in part by mapping the HIP sequence to any one sub-region selected from the warp field cache.

61. The system of claim 60, further comprising means for down-sampling the HIP sequence after it has been warped.

62. The system of claim 60, wherein the pre-rendered characters and arcs are cached as bitmaps in binary form.

63. The system of claim 60, further comprising a means for customizing the HIP sequence after it has been warped such as by adding at least one of texture and color to the HIP sequence.